

22122878-70

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re Application of: Anthony C. Zuppero et al. Art Unit: 1753

Serial No.: 10/625,801

Examiner: Diamond, Alan D.

Filing Date: July 23, 2003

Date: February 9, 2005

**TITLE: GAS SPECIE ELECTRON-JUMP CHEMICAL ENERGY CONVERTER**

Mail Stop Amendment  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

**INFORMATION DISCLOSURE STATEMENT****S I R:**

1. In accordance with the duty of disclosure under 37 C.F.R. § 1.56 and in conformance with the procedures of 37 C.F.R. §§ 1.97 and 1.98 and M.P.E.P. § 609, attorneys for Applicants hereby bring the following references, which are listed on the attached modified PTO Form No. 1449 to the attention of the Examiner. It is respectfully requested that the information be expressly considered during the prosecution of this application, and that the references be made of record therein and appear among the "References Cited" on any patent to issue therefrom.

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**CERTIFICATE OF TRANSMISSION**

I hereby certify that this correspondence is being facsimile transmitted to Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, Group Art Unit 1753 at (703) 872-9306 on February 9, 2005.

  
Amelia Finker

NYCDMS/434451.1

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2. Applicants respectfully request that the following co-owned patents and co-pending applications be considered and made of record in the present application:

US Patent Nos. 6,114,620 (cited on PTO-892 by the Examiner); 6,218,608 (cited on PTO-892 by the Examiner); 6,222,116 (cited on PTO-892 by the Examiner); 6,268,560 (cited on PTO-892 by the Examiner); 6,327,859 (cited on PTO-892 by the Examiner); 6,700,056 (cited on PTO-892 by the Examiner); 6,678,305 (cited on PTO-892 by the Examiner); 6,649,823 (cited on PTO-892 by the Examiner); and US Patent Application Nos. 09/682,363 (cited on PTO-892 by the Examiner); 10/218,706 (cited on PTO-892 by the Examiner); 10/185,086 (cited on PTO-892 by the Examiner); 09/631,463; 10/759,341; 10/052,004 (cited on PTO-892 by the Examiner). The references cited in each of those patents and applications are listed on Form 1449 accompanying this information disclosure statement.

3. Copies of the references listed on the modified PTO form 1449 will follow under separate cover by first class mail due to their volume.
4. This information disclosure statement is being filed under 37 C.F.R. § 1.97(b)(4), before the mailing date of a first Office action after the filing of a request for continued examination under §1.114.
5. No fee is deemed necessary with the filing of these documents. If a fee is deemed necessary, we authorize the Commissioner of Patents and

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6. Trademarks to charge Deposit Account No.: 02-0393.

Respectfully submitted,

Eunhee Park

Eunhee Park

Registration No. 42,976

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# **INFORMATION DISCLOSURE STATEMENT BY APPLICANT** (Use as many sheets as necessary)

Sheet 2 of 62

Application Number 10/625,801  
 Filing Date 7/23/2003  
 First Named Inventor Anthony C. Zuppero  
 Art Unit 1753  
 Examiner Name Alan D. Diamond  
 Attorney Docket Number 22122878-70

Examiner Initials*	Cite No. <sup>1</sup>	U. S. PATENT DOCUMENTS		Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		Document Number Number-Kind Code <sup>2</sup> (if known)	Publication Date MM-DD-YYYY		
	5	US- 20020070632	06-2002	Zuppero et al.	
	6	US- 4651324	03-1987	Prehn et al.	
	7	US- 5337329	08-1994	Foster, Jack	
	8	US- 4756000	07-1988	Macken, John A.	
	9	US- 5999547	12-1999	Schneider et al.	
	10	US- 5048042	09-1991	Moser et al.	
	11	US- 5587827	12-1996	Hakimi et al.	
	12	US- 4012301	03-1977	Rich et al.	
	13	US- 5470395	11-1995	Yater et al.	
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		Foreign Patent Document Country Code <sup>3</sup> Number <sup>4</sup> Kind Code <sup>5</sup> (if known)	Publication Date MM-DD-YYYY			

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This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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Art Unit	1753
Examiner Name	Alan D. Diamond
Attorney Docket Number	22122878-70

**U.S. PATENT DOCUMENTS**

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**FOREIGN PATENT DOCUMENTS**

[illegible]

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Signature**

Date	Considered
11/1/78	11/1/78
11/2/78	11/2/78
11/3/78	11/3/78
11/4/78	11/4/78
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<sup>1</sup> Unique citation designation number. <sup>2</sup> See attached Kinds of U.S. Patent Documents. <sup>3</sup> Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). <sup>4</sup> For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. <sup>5</sup> Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST. 16 if possible. <sup>6</sup> Applicant is to place a check mark here if English language translation is attached.

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Sheet 5 of 62

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Application Number	10/625,801
Filing Date	7/23/2003
First Named Inventor	Anthony C. Zuppero
Art Unit	1753
Examiner Name	Alan D. Diamond
Attorney Docket Number	22122878-70

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**Examiner  
Signature**

Date Considered

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Sheet 6 of 62

**Complete if Known**

Application Number	10/625,801
Filing Date	7/23/2003
First Named Inventor	Anthony C. Zuppero
Art Unit	1753
Examiner Name	Alan D. Diamond
Attorney Docket Number	22122878-70

**OTHER PRIOR ART - NON PATENT LITERATURE DOCUMENTS**

Examiner Initials	Cite No.	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published	yz
	22	HARRISON, P. et al., The Carrier Dynamics of Far-Infrared Intersubband Lasers and Tunable Emitters, Institute of Microwaves and Photonics, University of Leeds, U.K., pp. 1-64	
	23	WEBER, et al., 10 X2 Electron Transfer Times in Type-II GaAs/AlAs Superlattices Due to Emission of Confined and Interface Phonons, Superlattices and Microstructures, Vol. 23, No. 2 (1998).	
	24	FANN, W.S. et al., Electron Thermalization in Gold, Physical Review B, Brief Reports, Vol. 46, No. 20, (1992)	
	25	Ultrafast Surface Dynamics Group, Time-Resolved Two-Photon Photoemission (TR-2PPE), <a href="http://www.lip.physik.uni-essen.de/aeschlimann/2y_photo.htm">http://www.lip.physik.uni-essen.de/aeschlimann/2y_photo.htm</a>	
	26	LEWIS et al., Vibrational Dynamics of Molecular Overlayers on Metal Surfaces, Dept. of Chemistry, University of Pennsylvania, <a href="http://lorax.chem.upenn.edu/molsurf/cucotalk/html">http://lorax.chem.upenn.edu/molsurf/cucotalk/html</a> .	
	27	RETTNER et al., Dynamics of the Chemisorption of O2 on Pt(111): Dissociation via Direct Population of a Molecularly Chemisorbed Precursor at High Incidence Kinetic Energy, The Journal of Chemical Physics, Vol. 94, Issue 2 (1991)	
	28	FRIEDMAN et al., SiGe/Si THz Laser Based on Transitions Between Inverted Mass Light-Hole and Heavy Hole Standards, Applied Physics Letters, Vol. 78, No. 4 (2001)	
	29	HARRISON et al., Population Inversion and Gain Estimates for a Semiconductor TASER	
	30	HARRISON et al., Theoretical Studies of Subband Carrier Lifetimes in an Optically Pumped Three-Level-Terahertz Laser, Superlattices and Microstructures, Vol. 23, No. 2 (1998)	
	31	HARRISON et al., Room Temperature Population Inversion in SiGe TASER Designs, IMP, School of Electronic and Electrical Engineering, The University of Leeds	
	32	SUN et al., Phonon-Pumped Terahertz Gain in n-Type GaAs/AlGaAs Superlattices, Applied Physics Letters, Vol. 7; No.22 (2001)	

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STATEMENT BY APPLICANT**  
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Sheet 7 of 62

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Application Number	10/625,801
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First Named Inventor	Anthony C. Zuppero
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	33	ALTUKHOV et al., Towards Si1-xGeX Quantum-Well Resonant-State Terahertz Laser, Applied Physics Letters, Vol. 79, No. 24 (2001)	
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	35	SUN et al., Phonon Pumped SiGe/Si Interminiband Terahertz Laser	
	36	SOREF et al., Terahertz Gain in a SiGe/Si Quantum Staircase Utilizing the Heavy-Hole Inverted Effective Mass, Applied Physics Letters, Vol. 79, No. 22 (2004)	
	37	AESCHLIMANN et al., Competing Nonradiative Channels for Hot Electron Induced Surface Photochemistry, Chemical Physics 202, 127-141 (1996)	
	38	AUERBACH, Daniel J., Hitting the Surface Softly, Science, Vol. 294, pp. 2488-2489 (2001)	
	39	BADESCU et al., Energetics and Vibrational States for Hydrogen on Pt(111), Physical Review Letters, Vol. 88, No. 13 (2002)	
	40	BALANDIN et al., Effect of Phonon Confinement on the Thermoelectric Figure of Merit of Quantum Wells, Journal of Applied Physics, Vol. 84, No. 11 (1998)	
	41	BARTELS et al., Coherent Zone-Folded Longitudinal Acoustic Phonons in Semiconductor Superlattices: Excitation and Detection, Physical Review Letters, Vol. 82, No. 5 (1999)	
	42	BAUMBERG et al., Ultrafast Acoustic Phonon Ballistics in Semiconductor Heterostructures, Physical Review Letters, Vol. 78, No. 17 (1997)	
	43	BEDURFTIG et al., Vibrational and Structural Properties of OH Adsorbed on Pt(111), Journal of Chemical Physics, Vol. 111, No. 24 (1999)	

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STATEMENT BY APPLICANT**

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Sheet 8 of 62

Application Number	10/625,801
Filing Date	7/23/2003
First Named Inventor	Anthony C. Zuppero
Art Unit	1753
Examiner Name	Alan D. Diamond
Attorney Docket Number	22122878-70

**OTHER PRIOR ART -- NON PATENT LITERATURE DOCUMENTS**

Examiner Initials	Cite No.†	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published	T2
	44	VALDEN et al., Onset of Catalytic Activity of Gold Clusters on Titania with the Appearance of Nonmetallic Properties, Science, Vol. 281 (1998)	
	45	BONDZIE et al., Oxygen Adsorption on Well-Defined Gold Particles on TiO2(110), J. Vac. Sci. Technol. A17(4) (1999)	
	46	BEZANT et al., Intersubband Relaxation Lifetimes in p-GaAs/AlGaAs Quantum Wells Below the LO-Phonon Energy Measured in a Free Electron Laser Experiment, Semicond. Sci. Technol. 14 (1999)	
	47	BRAKO et al., Interaction of CO Molecules Adsorbed on Metal Surfaces, Vacuum 61,89-93 (2001)	
	48	BURGI et al., Confinement of Surface State Electrons in Fabry-Perot Resonators, Physical Review Letters, Vol. 81, No. 24 (1998)	
	49	BURGI et al., Probing Hot-Electron Dynamics at Surfaces with a Cold Scanning Tunneling Microscope, Physical Review Letters, Vol. 82, No. 22 (1999)	
	50	CHANG, Y.M., Interaction of Electron and Cold Plasma with Coherent Longitudinal Optical Phonons in GaAs, Applied Physics Letter, Vol. 80, No. 14 (2002)	
	51	CHANG et al., Observation of Coherent Surface Optical Phonon Oscillations by Time-Resolved Surface Second-Harmonic Generation, Physical Review Letters, Vol. 78, No. 24 (1997)	
	52	CHANG et al., Coherent Phonon Spectroscopy of GaAs Surfaces Using Time-Resolved Second-Harmonic Generation, Chemical Physics 251, 283-308 (2000)	
	53	CHANG et al. Observation of Local-Interfacial Optical Phonons at Buried Interfaces Using Time-Resolved Second Harmonic Generation, Physical Review B, Vol. 59, No. 19 (1999)	
	54	CHEN et al., Stimulate-Emission-Induced Enhancement of the Decay Rate of Longitudinal Optical Phonons in III-V Semiconductors; Applied Physics Letters, Vol. 80, No. 16 (2002)	

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Date

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	55	CORCELLI et al., Vibrational Energy Pooling in CO on NaCl(100): Methods, Journal of Chemical Physics, Vol. 116, No. 18 (2002)	
	56	FIERZ et al., Time-Resolved 2-Photon Photoionization on Metallic Nanoparticles, Appl. Phys. B 68 (1999); <a href="http://www.itp.physik.uni-essen.de/aeschlimann/abstract1.htm#6">http://www.itp.physik.uni-essen.de/aeschlimann/abstract1.htm#6</a>	
	57	BEZANT et al., Intersubband Relaxation Lifetimes in p-GaAs/AlGaAs Quantum Wells Below the LO-Phonon Energy Measured in a Free Electron Laser Experiment, Semicond. Sci. Technol., 14 No. 8 (1999)	Same as cite no. 46
	58	BONDZIE et al., Oxygen Adsorption on Well-Defined Gold Particles on TiO <sub>2</sub> (110), Journal of Vacuum Science & Technology A: Vacuum, Surfaces and Films, Vol. 17, Issue 4, pp. 1717-1720 (1999)	Same as cite no. 45
	59	HARRISON et al., Maximising the Population Inversion, by Optimizing the Depopulation Rate, in Far-Infrared Quantum Cascade Lasers (2001)	
	60	HARRISON et al., The Carrier Dynamics of Terahertz Intersubband Lasers, Some Publishing Company (1999)	
	61	FANN et al., Electron Thermalization in Gold, Physical Review B, Vol. 46, No. 20 (1992)	Same as cite no. 24
	62	CUMMINGS et al., Ultrafast Impulsive Excitation of Coherent Longitudinal Acoustic Phonon Oscillations in Highly Photoexcited InSb, Applied Physics Letters, Vol. 79, No. 6 (2001)	
	63	CHIANG, T.C., Photoemission Studies of Quantum Well States in Thin Films, Surface Science Reports 39, pp. 181-235 (2000)	
	64	DEBERNARDI et al., Anharmonic Phonon Lifetimes in Semiconductors from Density-Functional Perturbation Theory, Physical Review Letters, Vol. 75, No. 9 (1995)	
	65	DAVIS et al., Kinetics and Dynamics of the Dissociative Chemisorption of Oxygen on Ir(111), J. Chem. Phys. 109 (3) (1997)	

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	66	CHOI et al., Ultrafast Carrier Dynamics in a Highly Excited GaN Epilayer, Physical Review B, Vol. 63, 115315 (2001)	
	67	DIEKHONER et al., Parallel Pathways in Methanol Decomposition on Pt(111), Surface Science 409, pp. 384-391 (1998)	
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	76	de PAULA et al., Carrier Capture Processes in Semiconductor Superlattices due to Emission of confined Phonons, J. Appl. Phys. 77 (12) (1995)	

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Application Number	10/625,801
Filing Date	7/23/2003
First Named Inventor	Anthony C. Zuppero
Art Unit	1753
Examiner Name	Alan D. Diamond
Attorney Docket Number	22122878-70

**OTHER PRIOR ART - NON PATENT LITERATURE DOCUMENTS**

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	77	ENGSTROM et al., Comparing the Vibrational Properties of Low-Energy Modes of a Molecular and an Atomic Adsorbate: CO and O on Pt(111), Journal of Chemical Physics, Vol. 112, No. 4 (2000)	
	78	GLAVIN et al., Generation of High-Frequency Coherent Acoustic Phonons in a Weakly Coupled Superlattice, Applied Physics Letters, Vol. 74, No. 23 (1999)	
	79	FRIEDMAN, SiGe/Si Thz Laser Based on Transitions Between Inverted Mass Light-Hole and Heavy-Hole Subbands, Applied Physics Letters, Vol. 78, No. 4 (2001)	Same as cite no. 28
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	85	HARRISON et al., The Carrier Dynamics of Terahertz Intersubband Lasers, Some Publishing Company (1999)	Same as cite no. 60
	86	HARRISON et al., Population-Inversion and Gain Estimates for a Semiconductor Taser	
	87	HARRISON et al., Theoretical studies of Subband Carrier Lifetimes in an Optically Pumped Three-Level Terahertz Laser, Superlattices and Microstructures, Vol. 23, No. 2 (1998)	Same as cite no. 30

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Sheet 12 of 62

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Application Number	10/625,801
Filing Date	7/23/2003
First Named Inventor	Anthony C. Zuppero
Art Unit	1753
Examiner Name	Alan D. Diamond
Attorney Docket Number	22122878-70

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	88	HARRISON et al., The Carrier Dynamics o Far-Infrared Intersubband Lasers and Tunable Emitters, <a href="http://www.ee.leeds.ac.uk/homes/ph/">www.ee.leeds.ac.uk/homes/ph/</a>	Same as cite no. 22
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	98	LEWIS et al, Substrate-Adsorbate Coupling in Co-Adsorbed Copper, Physical Review Letters, Vol. 77, No. 26 (1996)	

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Application Number	10/625,801
Filing Date	7/23/2003
First Named Inventor	Anthony C. Zuppero
Art Unit	1753
Examiner Name	Alan D. Diamond
Attorney Docket Number	22122878-70

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	99	KRAUSS et al., Coherent Acoustic Phonons in a Semiconductor Quantum Dot, Physical Review Letters, Vol. 79, No. 25 (1997)	
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Application Number	10/625,801
Filing Date	7/23/2003
First Named Inventor	Anthony C. Zuppero
Art Unit	1753
Examiner Name	Alan D. Diamond
Attorney Docket Number	22122878-70

Sheet 14 of 62

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	111	PAGGEL et al., Quantum-Well States as Fabry-Perot Modes in a Thin-Film Electron Interferometer, Science, Vol. 283 (1999)	
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Art Unit	1753
Examiner Name	Alan D. Diamond
Attorney Docket Number	22122878-70

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	133	TAYLOR et al., Strong Electron-LO Phonon Scattering and Hot Carrier Relaxation in GaN, Abstract No. ba249KW3	
	134	SUN et al., Phonon-Pumped Terahertz Gain in n-Type GaAs/AlGaAs Superlattices, Applied Physics Letters, Vol. 78, No. 22 (2001)	Same as cite no. 32
	135	TOM et al., Coherent Phonon and Electron Spectroscopy on Surfaces Using Time-Resolved Second-Harmonic Generation	
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	138	TRIPA et al., Surface-Aligned Photochemistry: Aliming Reactive Oxygen Atoms Along a Single Crystal Surface, Journal of Chemical Physics, Vol. 112, No. 5 (2000)	Same as cite no. 130
	139	TSAI et al., Theoretical Modeling of Nonequilibrium Optical Phonons and Electron Energy Relaxation in GaN, Journal of Applied Physics, Vol. 85, No. 3 (1999)	Same as cite no. 129
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First Named Inventor	Anthony C. Zuppero
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	153	HARRISON et al., The Carrier Dynamics of Terahertz Intersubband Lasers, Some Publishing Company (1999)	Same as cite no. 60

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Sheet 18 of 62

Application Number	10/625,801
Filing Date	7/23/2003
First Named Inventor	Anthony C. Zuppero
Art Unit	1753
Examiner Name	Alan D. Diamond
Attorney Docket Number	22122878-70

**OTHER PRIOR ART - NON PATENT LITERATURE DOCUMENTS**

Examiner Initials	Cite No.	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T <sup>2</sup>
	154	HARRISON et al., The Carrier Dynamics of Far-Infrared Intersubband Lasers and Tunable Emitters, www.ee.leeds.ac.uk/homes/ph/	Same as cite no. 22
	155	HARRISON et al., Theoretical Studies of Subband Carrier Lifetimes in an Optically Pumped Three-Level Terahertz Laser, Superlattices and Microstructures, Vol. 23, No. 2 (1998)	Same as cite no. 30
	156	HARRISON et al., Room Temperature Population Inversion in SiGe TASER Designs	Same as cite no. 31
	157	HARRISON et al., Population-Inversion and Gain Estimates for a Semiconductor TASER,	Same as cite no. 29
	158	SUN et al., Phonon Pumped SiGe/Si Intersubband Terahertz Laser	Same as cite no. 35
	159	SOREF et al., Terahertz Gain in a SiGe/Si Quantum Staircase Utilizing the Heavy-Hole Inverted Effective Mass, Applied Physics Letters, vol. 79, No. 22 (2001)	Same as cite no. 36
	160	SUN et al., Intersubband Lasing Lifetimes of SiGe/Si and GaAs/AlGaAs Multiple Quantum Well Structures, Appl. Phys. Letter 66 (25) (1995)	Same as cite no. 34
	161	SUN et al., Phonon-Pumped Terahertz Gain in n-Type GaAs/AlGaAs Superlattices, Applied Physics Letters, Vol. 78, No. 22 (2001)	Same as cite no. 32
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	163	CASASSA et al., Time-Resolved Measurements of Vibrational Relaxation of Molecules on surfaces: Hydroxyl Groups on Silica Surfaces, Journal of Vacuum Science & Technology A: Vacuum, Surfaces, and Films, Vol. 3, Issue 3 (1985)	
	164	CAVANAGH et al., Vibrational Relaxation of Adsorbed Molecules: Comparison with Relaxation Rates of Model Compounds, Journal of Vacuum Science & Technology A: Vacuum, Surfaces and Films, Vol. 5, Issue 4 (1987)	

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First Named Inventor	Anthony C. Zuppero
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Attorney Docket Number	22122878-70

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	165	RYH et al., Methanol Oxidation of Palladium Compared to Rhodium at Ambient Pressures as Probed by Surface-Enhanced Raman and Mass Spectroscopies, <i>Journal of Catalysis</i> , Vol. 174 (2) (1998)	
	166	GUMHALTER et al., Effect of Electronic Relaxation on Covalent Adsorption Reaction Rates, <i>Physical Review B</i> , Vol. 30, Issue 6 (1984)	
	167	NOLAN et al., Surface Science, Direct Verification of a High-Translational-Energy Molecular Precursor to Oxygen Dissociation on Pd(111), <i>Surface Science</i> , Vol. 419 (1998)	
	168	PHIHAL et al., Role of Intra-Adsorbate Coulomb Correlations in Energy Transfer at Metal Surfaces, <i>Physical Review B</i> , Vol. 58, Issue 4 (1998)	
	169	TULLY et al., Electronic and Phonon Mechanisms of vibrational Relaxation: CO on Cu(100), <i>J. Vac. Sci. Technol. A</i> 11(4) (1993)	Same as cite no. 110
	170	DIMATTEO et al., Enhanced Photogeneration of Carriers in a Semiconductor Via Coupling Across a Nonisothermal Nonascale Vacuum Gap, <i>Applied Physics Letters</i> , Vol. 79, Issue 12 (2001)	
	171	TRIPA et al., Surface-Aligned Photochemistry: Aiming Reactive Oxygen Atoms Along a Single Crystal Surface, <i>The Journal of Chemical Physics</i> , Vol. 112, Issue 5 (2000)	Same as cite no. 130
	172	YATES et al., Special Adsorption and Reaction Effects at Step Defect Sites on Platinum Single Crystal Surfaces (2000)	
	173	DEKORSY et al., Coherent Acoustic Phonons in Semiconductor Superlattices, <i>phys. stat. sp.</i> , (b) 215, p 425-430 (1999)	

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Filing Date	7/23/2003
First Named Inventor	Anthony C. Zuppero
Art Unit	1753
Examiner Name	Alan D. Diamond
Attorney Docket Number	22122878-70

**U.S. PATENT DOCUMENTS**

Examiner Initials	Cite No.	Document Number Number - Kind Code <sup>1</sup> (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	176	US- 6,119,651	09-19-2000	Anderson	
	175	US- 5,408,967	04-25-1995	Foster	
	176	US- 5,293,857	03-13-1994	Meyer	
	177	US-2002/0121088	9-5-2002	Zuppero et al.	
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Sheet	21	of	62
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Application Number	10/625,801
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First Named Inventor	Anthony C. Zuppero
Art Unit	1753
Examiner Name	Alan D. Diamond
Attorney Docket Number	22122878-70

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Art Unit	1753
Examiner Name	Alan D. Diamond
Attorney Docket Number	22122878-70

Sheet 22 of 62

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	184	AUERBACH, Daniel J.; "Hitting the Surface--Softly"; Science, 294, (2001), pp. 2488-2489 Same as cite no. 38	
	185	BONDZIE, V. A., et al.; "Oxygen adsorption ... gold particles ... TiO <sub>2</sub> (110)"; J. Vac. Sci. Tech. A., (1999) 17, pp. 1717 and figure 3 Same as cite no. 45	
	186	BOULTER, James; "Laboratory Measurement of OH ..."; <a href="http://pearl1.lanl.gov/wsa2002/WSA2002talks.pdf">http://pearl1.lanl.gov/wsa2002/WSA2002talks.pdf</a>	
	187	CHAN H.Y.H., et al.; "Methanol Oxidation On Palladium Compared To Rhodium..."; J. Catalysis v. 174(#2) pp. 191-200 (1998) (abstract and figure 1 only) Same as cite no. 165	
	188	CHIANG, T.-C.; "Photoemission studies of quantum well states in thin films; Surf. Sci. Rpts.39 (2000) pp 181-235 Same as cite no. 63	
	189	CHUBB, D. L., et al.; "Semiconductor Silicon as a Selective Emitter"; <a href="http://www.thermopv.org/TPV5-2-05-Chubb.pdf">http://www.thermopv.org/TPV5-2-05-Chubb.pdf</a> (abstract only)	
	190	CORCELLI, S. A., et al.; "Vibrational energy pooling in CO on NaCl(100) ..."; J. Chem. Phys. (2002) 116, pp. 8079-8092 Same as cite no. 55	
	191	DANBSE, A., et al.; "Influence of the substrate electronic structure on metallic quantum well ..."; Prog. Surf. Sci., 67, (2001), pp 249-258	
	192	DAVIS, J. H., et al.; "Kinetics and dynamics of the dissociative chemisorption of oxygen on Ir(111)"; J. Chem. Phys. 107 (3), (1997), pp 943-952 Same as cite no. 65	

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Application Number	10/625,801
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First Named Inventor	Anthony C. Zuppero
Art Unit	1753
Examiner Name	Alan D. Diamond
Attorney Docket Number	22122878-70

Sheet	23	of	62
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	193	DIEKHONER, L., et al.; "Parallel pathways in methanol... Pt(111)"; Surf. Sci. 409 (1998) pp 384-391
	194	DIBSING, D., et al.; "Aluminum oxide tunnel junctions..."; Thin Solid Films, Vol. 342 (1-2) (1999) pp. 282-290
	195	DIMATTEO, R. S., et al.; "Enhanced photogeneration of carriers... vacuum gap"; Appl. Phys. Lett. (2001) 79, pp. 1894-1896
	196	DIMATTEO, R. S., et al.; "Introduction to and Experimental Demonstration of Micron-gap ThermoPhotoVoltaics"; <a href="http://www.thermopr.org/37DiMatteo.html">http://www.thermopr.org/37DiMatteo.html</a> (abstract only)
	197	DOGWILER, Urs, et al.; "Two-dimensional ... catalytically stabilized ... lean methane-air ..."; Combustion and Flame, (1999), 116(1,2), pp 243-258
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	201	FANN, W.S., et al.; "Electron thermalization in gold"; Phys. Rev. B (1992) 46 pp. 13592-13595

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	202	GER, Adam T., et al.; "The dynamics of O2 adsorption on Pt(533)..."; J. Chem. Phys.(2000) 113, pp. 10333-10343	
	203	GERGEN, Brian, et al.; "Chemically Induced Electronic Excitations at Metal Surfaces"; Science, 294, (2001) pp. 2521-2523	Same as cite no. 82
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	210	HO, Wilson; <a href="http://www.lassp.cornell.edu/lassp_data/wilsonho.html">http://www.lassp.cornell.edu/lassp_data/wilsonho.html</a>	

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Art Unit 1753  
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	211	HOHLFELD, J. et al.; "Electron and lattice dynamics ... optical excitation of metals"; Chemical Physics, 251 (2000) pp 237-258	Same as cite no. 90
	212	HONKALA, Karolilna, et al.; "Ab initio study of O2 precursor states on the Pd(111)..."; J. Chem. Phys. (2001) 115, pp. 2297-2302	
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	214	HOU, H., et al.; "Direct multiquantum relaxation of highly vibrationally excited NO ..."; J. Chem. Phys., 110, (1999) pp 10660 - 10663	
	215	HUANG Y., et al.; "Observation of Vibrational Excitation and Deexcitation for NO from Au(111) ..."; Phys. Rev. Lett., 84, (2000) pp 2985 - 2988	Same as cite no. 97
	216	HUANG, Yuhui, et al.; "Vibrational Promotion of Electron Transfer"; SCIENCE, VOL 290, 6 OCTOBER 2000, pp 111 - 113	Same as cite no. 91
	217	IBH; "NanoLED overview"; <a href="http://www.ibh.co.uk/products/light_sources/nanoled_main.htm">http://www.ibh.co.uk/products/light_sources/nanoled_main.htm</a>	
	218	IBH; "Red picosecond laser sources"; <a href="http://www.ibh.co.uk/products/light_sources/nanoled/heads/red_laser_heads.htm">http://www.ibh.co.uk/products/light_sources/nanoled/heads/red_laser_heads.htm</a>	
	219	IFTIMIA, Ilana, et al.; "Theory ... scattering of molecules from surface"; Phys. Rev. B (2002) 65, Article 125401	

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	220	ISHIKAWA, Yasuyuki, et al.; "Energetics of H <sub>2</sub> O dissociation and COads+OHads reaction ... Pt."; Surf. Sci. preprints SUSC 12830, 27 April 2002	
	221	JOHNSON, R. Colin; "Molecular substitution ... terahertz switch arrays"; EB Times, (04/10/00, 3:35 p.m. EST) <a href="http://www.eet.com/story/OBG20000410S0057">http://www.eet.com/story/OBG20000410S0057</a>	
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	225	KOMEDA, T., et al.; "Lateral Hopping of Molecules Induced by Excitation of Internal Vibration..."; Science, 295, (2002) pp 2055-2058	Same as cite no. 92
	226	LEWIS, Steven P., et al.; "Continuum Elastic Theory of Adsorbate Vibrational Relaxation"; J. Chem. Phys. 108, 1157 (1998)	Same as cite no. 94
	227	LEWIS, Steven P., et al.; "Substrate-adsorbate coupling in CO-adsorbed copper"; Phys. Rev. Lett. 77, 5241 (1996)	Same as cite no. 98
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**INFORMATION DISCLOSURE  
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Sheet 27 of 62**Complete if Known**

Application Number	10/625,801
Filing Date	7/23/2003
First Named Inventor	Anthony C. Zuppero
Art Unit	1753
Examiner Name	Alan D. Diamond
Attorney Docket Number	22122878-70

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	229	MITSUI, T., et al.; "Coadsorption and Interactions of O and H on Pd(111)"; Surf. Sci., Article 12767, (2002)	
	230	MOULA, Md. Golam, et al.; "Velocity distribution of desorbing CO <sub>2</sub> in CO oxidation on Pd(110)..."; Applied Surf. Sci., 169-170, pp 268-272 (2001)	
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	232	NIENHAUS, H., et al.; "Direct detection of electron-hole pairs generated by chemical reactions on metal surfaces"; Surf. Sci. 445 (2000) pp 335-342	Same as cite no. 102
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	236	NIENHAUS, H., et al.; "Electron-Hole Pair Creation at Ag and Cu ... of Atomic Hydrogen and Deuterium"; Phys. Rev. Lett., 82, (1999) pp. 446-449	Same as cite no. 101
	237	NOLAN P. D., et al.; "Direct verification of... precursor to oxygen dissociation on Pd(111)"; Surf. Sci. v. 419(#1) pp. L107-L113, (1998)	Same as cite no. 108

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Examiner Name	Alan D. Diamond
Attorney Docket Number	22122878-70

Sheet 28 of 62

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	238	NOLAN, P. D., et al.; "Molecularly chemisorbed intermediates to oxygen adsorption on Pt..."; J. Chem. Phys. 111, (1999), pp 3696 - 3704	Same as cite no. 107
	239	NOLAN, P. D., et al.; "Translational ... Precursors to Oxygen Adsorption on Pt(111)"; Phys. Rev. Lett., 81, (1998) pp 3179 - 3182	Same as cite no. 105
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	241	PAGGEL, J. J., et al.; "Quantum-Well States as Fabry-Pérot Modes in a ..."; Science, 283, (1999), pp 1709 - 1711	Same as cite no. 111
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	245	RINNEMO, Mats; "Catalytic Ignition and Kinetic Phase Transitions"; 1996; <a href="http://www2.lib.chalmers.se/cih/diss/doc/9596/RinnemoMats.html">http://www2.lib.chalmers.se/cih/diss/doc/9596/RinnemoMats.html</a>	
	246	ROBERTSON, A. J. B.; "Catalysis of Gas Reactions by Metals"; Logos Press Limited; 1970; LC # 70-80936; pp. 1-5, 10, 41; Great Britain, Adlard & son Ltd	

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## **Complete if Known**

Application Number 10/625,801  
 Filing Date 7/23/2003  
 First Named Inventor Anthony C. Zuppero  
 Art Unit 1753  
 Examiner Name Alan D. Diamond  
 Attorney Docket Number 22122878-70

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	247	SCHBWE, P., et al.; "CO2 Production at the Single-Molecule Level"; <a href="http://www.alp.org/enews/physnews/2001/split/561-1.html">http://www.alp.org/enews/physnews/2001/split/561-1.html</a>	
	248	SHENG, H., et al.; "Schottky diode with Ag on (110) epitaxial ZnO film"; Appl. Phys. Lett. (2002) 80, pp. 2132-2134	
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	254	TARVER, Craig M.; "Non-Equilibrium Chemical Kinetic ... Explosive Reactive Flows"; Fall 1999 IMA Workshop: High-Speed Combustion in Gaseous and Condensed-Phase	
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Sheet 30 of 62

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Filing Date	7/23/2003
First Named Inventor	Anthony C. Zuppero
Art Unit	1753
Examiner Name	Alan D. Diamond
Attorney Docket Number	22122878-70

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	256	TEODORRESCU, C.M., et al.; "Structure of Fe layers grown on InAs ..."; Appl. Surf. Sci., 166, (2000) pp 137-142	
	257	TIUSAN, C., et al.; "Quantum coherent transport versus diode-like effect in ..."; Appl. Phys. Lett. 79, (2001) pp 4231-4233	Same as cite no. 136
	258	TRIPA, C. Emil, et al.; "Surface-aligned photochemistry: Aiming reactive oxygen atoms ..."; J. Chem. Phys., (2000) 112 pp. 2463-2469	Same as cite no. 130
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Application Number	10/625,801
Filing Date	7/23/2003
First Named Inventor	Anthony C. Zuppero
Art Unit	1753
Examiner Name	Alan D. Diamond
Attorney Docket Number	22122878-70

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	264	WILKE, Steffen, et al.; "Theoretical investigation of water formation on Rh and Pt Surfaces"; J. Chem. Phys., 112, (2000) PP 9986 - 9995	
	265	WINTERLIN, J. et al; "Atomic ...Reaction Rates ... Surface-Catalyzed ..."; Science, 278, (1997) pp. 1931 - 1934	
	266	WINTERLIN, J. R., et al.; "Existence of a "Hot" Atom Mechanism for the Dissociation of O <sub>2</sub> on Pt(111)"; Phys. Rev. Lett., 77, (1996), pp 123 - 126	Same as cite no. 141
	267	ZAMBELLI, T., et al.; "Complex pathways in dissociative adsorption of oxygen on platinum"; Nature 390, pp 495 - 497 (1997)	Same as cite no. 149
	268	ZHDANOV, V.P., et al.; "Substrate-mediated photoinduced chemical reactions on ultrathin metal films"; Surf. Sci., V. 432 (#3) pp L599-L603, (1999)	Same as cite no. 150
	269	ZHDANOV, Vladimir P.; "Nm-sized metal particles on a semiconductor surface, Schottky ..."; Surf. Sci. PROOF SUSC 2931, 20 April 2002	Same as cite no. 147
	270	ZHUKOV, V. P., et al.; "Lifetimes of quasiparticle excitations in 4d transition metals ..."; Phys. Rev. B (2002) 65, Article 115116	

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	271	US-5932885	08-1999	DeBellis et al.	Same as cite no. 15
	272	US-2001/0018923-A1	09-2001	Zuppero et al.	
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	274	REE, J. et al., "Dynamics of Gas-Surface Interactions: Reaction of Atomic Oxygen with Chemisorbed Hydrogen on TUNGSTEN," Journal of Physical Chemistry, Vol. 101 (#25), pp. 4523 - 4534, June 19, 1997.	
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	276	NOLAN, P.D. et al., "Molecularly chemisorbed intermediates to oxygen adsorption on Pt(111): A molecular beam and electron energy-loss spectroscopy study," Journal of Chemical Physics, Vol. 111, No. 8, pp. 3696 - 3704, August 22, 1999.	Same as cite no. 107
	277	NOLAN, P. D. et al., "Translation Energy Selection of Molecular Precursors to Oxygen Adsorption on Pt (111)," Physical Review Letters, Vol. 81, No. 15, pp. 3179 - 3182, October 12, 1998.	Same as cite no. 105
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	281	NOLAN, P. D. et al., "Direct verification of a high- translational-energy molecular precursor to oxygen dissociation on Pd(111)," <i>Surface Science Letters</i> , Vol. 419, pp. L107 - L113, September 24, 1998.	Same as cite no. 108
	282	DAVIS, J. E. et al., "Kinetics and dynamics of the dissociative chemisorption of oxygen on Ir(111)," <i>Journal of Chem. Phys.</i> , Vol. 107(3), pp. 943 - 952, July 15, 1997.	Same as cite no. 65
	283	TRIPA, C. Emil et al., "Surface-aligned reaction of photo-generated oxygen atoms with carbon monoxide targets," <i>Nature</i> , Vol. 398, pp. 591 - 593, April 15, 1999, <a href="http://www.nature.com">www.nature.com</a> .	Same as cite no. 131
	284	SHIN HK, "Vibrationally excited OD Radicals from the Reaction of Oxygen-Atoms with Chemisorbed Deuterium on TUNGSTEN," <i>Journals of Physical Chemistry</i> , Vol. 102(#13), pp. 2372 - 2380, March 26, 1998.	
	285	TRIPA, C. Emil et al., "Kinetics measurements of CO photo-oxidation on Pt(111)," <i>Journal of Chemical Physics</i> , Vol. 105, Issue 4, pp. 1691 - 1696, July 22, 1996.	Same as cite no. 132

Examiner  
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Date  
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# INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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Sheet	35	of	62
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**Complete if Known**

Application Number	10/625,801
Filing Date	7/23/2003
First Named Inventor	Anthony C. Zuppero
Art Unit	1753
Examiner Name	Alan D. Diamond
Attorney Docket Number	22122878-70

**U.S. PATENT DOCUMENTS**

[illegible]

## FOREIGN PATENT DOCUMENTS

[illegible]

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Signature**

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Considered

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<sup>1</sup> Unique citation designation number. <sup>2</sup> See attached Kinds of U.S. Patent Documents. <sup>3</sup> Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). <sup>4</sup> For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. <sup>5</sup> Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST. 16 if possible. <sup>6</sup> Applicant is to place a check mark here if English language Translation is attached.

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# INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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Sheet	36	of	62
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Application Number	10/625,801
Filing Date	7/23/2003
First Named Inventor	Anthony C. Zuppero
Art Unit	1753
Examiner Name	Alan D. Diamond
Attorney Docket Number	22122878-70

**U.S. PATENT DOCUMENTS**

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**INFORMATION DISCLOSURE  
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Sheet 38 of 62

**Complete if Known**

Application Number	10/625,801
Filing Date	7/23/2003
First Named Inventor	Anthony C. Zuppero
Art Unit	1753
Examiner Name	Alan D. Diamond
Attorney Docket Number	22122878-70

**U.S. PATENT DOCUMENTS**

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Sheet	39	of	62
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Application Number	10/625,801
Filing Date	7/23/2003
First Named Inventor	Anthony C. Zuppers
Art Unit	1753
Examiner Name	Alan D. Diamond
Attorney Docket Number	22122878-70

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Sheet 40 of 62

**Complete if Known**

Application Number	10/625,801
Filing Date	7/23/2003
First Named Inventor	Anthony C. Zuppero
Art Unit	1753
Examiner Name	Alan D. Diamond
Attorney Docket Number	22122878-70

**OTHER PRIOR ART - NON PATENT LITERATURE DOCUMENTS**

Examiner Initials*	Cite No.†	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	Y2
	302	FRSEB, et al., "Analysis of Current/Voltage Curves at n-Si/SiO <sub>2</sub> /Pt Electrodes", J. Electrochem. Soc., December 1994, pp. 3375-3382, Vol. 141, No. 12, The Electrochemical Society, Inc.	
	303	FRSEB, et al., "Methanol Oxidation at p-Si/Pt Electrodes, Evidence for Hot Hole Reactivity", J. Phys. Chem., 1995, pp. 6074-6083, Vol. 99, American Chemical Society.	
	304	GADZUK, "Multiple Electron Processes in Hot-Electron Femtochemistry at Surfaces", <a href="http://www.esrl.nist.gov/div837/837.03/highlite/gadzuk1999.htm">http://www.esrl.nist.gov/div837/837.03/highlite/gadzuk1999.htm</a> .	
	305	FRSEB, et al., "Hot Electron Reduction at Etched n-Si/Pt Thin Film Electrodes", J. Electrochem. Soc., September 1994, pp. 2402-2409, Vol. 103, The Electrochemical Society Inc.	
	306	GAILLARD, et al., "Hot Electron Generation in Aqueous Solution at Oxide-Covered Tantalum Electrodes, Reduction of Methylpyridinium and Electrogenenerated Chemiluminescence of Ru(bpy) <sub>3</sub> <sup>2+</sup> ", J. Phys. Chem., 1999, pp. 667-674, Vol. 103, American Chemical Society.	
	307	SUNG, et al., "Demonstration of Electrochemical Generation of Solution-Phase Hot Electrons at Oxide-Covered Tantalum Electrodes by Direct Electrogenenerated Chemiluminescence", J. Phys. Chem., 1998, pp. 9797-9805, Vol. 102, American Chemical Society.	
	308	ZHDANOV, et al., "Substrate-mediated photoinduced chemical reactions on ultrathin metal films", Surface Science, 1999, pp. L599-L603, Vol. 432, Elsevier Science B.V.	

Same as cite no. 150

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Application Number	10/625,801
Filing Date	7/23/2003
First Named Inventor	Anthony C. Zuppero
Art Unit	1753
Examiner Name	Alan D. Diamond
Attorney Docket Number	22122878-70

**U.S. PATENT DOCUMENTS**

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Sheet 43 of 62

**Complete if Known**

Application Number	10/625,801
Filing Date	7/23/2003
First Named Inventor	Anthony C. Zuppero
Art Unit	1753
Examiner Name	Alan D. Diamond
Attorney Docket Number	22122878-70

**OTHER PRIOR ART - NON PATENT LITERATURE DOCUMENTS**

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	316	BONN, M. et al., "Phonon-Versus Electron-Mediated Desorption and Oxidation of CO on Ru(0001)," Science, Vol. 285, No. 5430, Issue of 13 August 1999, pp. 1042-1045.	Same as cite no. 280
	317	DAVIS, J. E. et al., "Kinetics and dynamics of the dissociative chemisorption of oxygen on Ir(111)," J. Chem. Phys., 107 No. 3, 15 July 1997, pp. 943-951.	Same as cite no. 65
	318	GADZUK, J. W., "Hot-electron femtochemistry at surfaces: on the role of multiple electron processes in desorption," Chemical Physics, Vol. 251, year 2000, pp. 87-97.	
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	320	GE, N.-H. et al., "Femtosecond Dynamics of Electron Localization at Interfaces," Science, vol. 279, No. 5348, Issue of 9 Jan 1998, pp. 202-205.	
	321	GAO, Shiwu, "Quantum kinetic theory of vibrational heating and bond breaking by hot electrons," Physical Review B, Vol. 55, No. 3, 15 Jan 1997-I, pp. 1876-1886.	
	322	HOU, H. et al., "Enhanced Reactivity of Highly Vibrationally Excited Molecules on Metal Surfaces," Science, Vol. 284, No. 5420, Issue of 4 Jun 1999, pp. 1647-1650.	
	323	NIENHAUS, H. et al., "Direct detection of electron hole pairs generated by chemical reactions on metal surfaces," Surface Science 445 (2000) pp. 335-342.	Same as cite no. 103
	324	NIENHAUS, H. et al., "Selective H atom sensors using ultrathin Ag/Si Schottky diodes," Applied Physics Letters, June 28, 1999, Vol. 74, Issue 26, pp. 4046-4048.	Same as cite no. 106
	325	GAILLARD, Frederic et al., "Hot electron generation in aqueous solution at oxide-covered tantalum electrodes. Reduction of methylpyridinium and electrogenerated chemiluminescence of Ru(bpy) <sub>3</sub> <sup>2+</sup> ," Journal of Physical Chemistry B., Vol. 103, No. 4, January 28 1999, pp. 667-74.	Same as cite no. 306
	326	ENGSTROM, Ulrika and RYBERG, Roger, "Comparing the vibrational properties of low-energy modes of a molecular and an atomic adsorbate: CO and O on Pt (111)," Journal Of Chemical Physics, Vol. 112, No. 4, 22 January 2000, pp. 1959-1965.	Same as cite no. 77

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# **INFORMATION DISCLOSURE STATEMENT BY APPLICANT**

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Sheet 44 of 62

## **Complete if Known**

Application Number 10/625,801  
Filing Date 7/23/2003  
First Named Inventor Anthony C. Zuppero  
Art Unit 1753  
Examiner Name Alan D. Diamond  
Attorney Docket Number 22122878-70

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	327	NOLAN, P. D. et al., "Molecularly chemisorbed intermediates to oxygen adsorption on Pt (111): A molecular beam and electron energy-loss spectroscopy study," Journal Of Chemical Physics, Vol. 111, No. 8, 22 August 1999.	Same as cite no. 107
	328	NOLAN P. D. et al., "Direct verification of a high-translational-energy molecular precursor to oxygen dissociation on Pd(111)," Surface Science Vol. 419, pp. L107-L113, December 24, 1998.	Same as cite no. 108
	329	OTTO, Andreas et al., "Role of atomic scale roughness in hot electron chemistry," Journal of Physical Chemistry B, Vol. 103, No. 14, April 8, 1999, pp. 2696-2701.	
	330	PLIHAL, M. et al., "Role of intra-adsorbate Coulomb correlations in energy transfer at metal surfaces," Physical Review B, Vol. 58, No. 4, July 15, 1998, pp. 2191-2206.	Same as cite no. 168
	331	SUNG, Yung-Eun et al., "Enhancement of electrochemical hot electron injection into electrolyte solutions at oxide-covered tantalum electrodes by thin platinum films," Journal of Physical Chemistry B, Vol. 102, No. 49, December 3 1998, pp. 9806-11.	
	332	ZHDANOV, V. P. et al., "Substrate-mediated photoinduced chemical reactions on ultrathin metal films," Surface Science, Vol. 432 (#3), pp. L599-L603, July 20, 1999.	Same as cite no. 150
	333	NIENHAUS, H., "Electron-hole pair creation by reactions at metal surfaces," American Physical Society, Centennial Meeting Program, March 20-26, 1999, Atlanta, GA, Session SC33 - Metal Surfaces: Adsorbates. <a href="http://www.aps.org/meet/CENT99/BAPS/">http://www.aps.org/meet/CENT99/BAPS/</a>	Same as cite no. 235
	334	NIENHAUS, H et al., "Electron-Hole Pair Creation at Ag and Cu Surfaces by Adsorption of Atomic Hydrogen and Deuterium," Physical Review Letters, Vol. 82, Issue 2, January 11, 1999, pp. 446-449.	Same as cite no. 101

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Sheet	45	of	62
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**Complete If Known**

Application Number	10/625,801
Filing Date	7/23/2003
First Named Inventor	Anthony C. Zuppero
Art Unit	1753
Examiner Name	Alan D. Diamond
Attorney Docket Number	22122878-70

## OTHER PRIOR ART - NON PATENT LITERATURE DOCUMENTS

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## INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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Sheet	46	of	62
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Application Number	10/625,801
Filing Date	7/23/2003
First Named Inventor	Anthony C. Zuppero
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Examiner Name	Alan D. Diamond
Attorney Docket Number	22122878-70

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STATEMENT BY APPLICANT**

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Sheet 47 of 62

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Application Number	10/625,801
Filing Date	7/23/2003
First Named Inventor	Anthony C. Zuppero
Art Unit	1753
Examiner Name	Alan D. Diamond
Attorney Docket Number	22122878-70

U. S. PATENT DOCUMENTS					
Examiner Initials*	Cite No. <sup>1</sup>	Document Number Number-Kind Code <sup>2</sup> (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	337	US-6,537,829	03-2003	Zarling et al.	
	338	US-6,444,476	09-2002	Morgan, Christopher Grant	
	339	US-6,399,397	06-2002	Zarling et al.	
	340	US-6,312,914	11-2001	Kardos et al.	
	341	US-6,251,687	06-2001	Buechler et al.	
	342	US-6,236,931	05-2001	Buechler et al.	
	343	US-6,159,686	12-2000	Kardos et al.	
	344	US-6,891,656	04-1999	Zarling et al.	
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STATEMENT BY APPLICANT**

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Sheet 48 of 62

**Complete if Known**

Application Number	10/625,801
Filing Date	7/23/2003
First Named Inventor	Anthony C. Zuppero
Art Unit	1753
Examiner Name	Alan D. Diamond
Attorney Docket Number	22122878-70

Examiner Initials*	Cite No. <sup>1</sup>	U. S. PATENT DOCUMENTS		Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		Document Number Number-Kind Code <sup>2</sup> (if known)	Publication Date MM-DD-YYYY		
	345	US-2003/0207331	11-2003	Wilson et al.	
	346	US-2003/0166307	09-2003	Zuppero et al.	
	347	US-2003/0100119	05-2003	Weinberg et al.	
	348	US-2003/0030067	02-2003	Chen, Wei	
	349	US-2003/0019517	01-2003	McFarland, Erick W.	
	350	US-2002/0121088	09-2002	Zuppero et al.	Same as cite no. 177
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	352	US-2002/0045190	04-2002	Wilson et al.	
	353	US-2002/0017827	02-2002	Zuppero et al.	
	354	US-6,700,056	03-2004	Zuppero et al.	
	355	US-6,649,823	11-2003	Zuppero et al.	
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# INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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Sheet 52 of 62

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Application Number 10/625,801  
Filing Date 7/23/2003  
First Named Inventor Anthony C. Zuppero  
Art Unit 1753  
Examiner Name Alan D. Diamond  
Attorney Docket Number 22122878-70

## OTHER PRIOR ART - NON PATENT LITERATURE DOCUMENTS

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	373	ACHERMANN, M. et al., "Carrier dynamics around nano-scale Schottky contacts: a femtosecond near-field study", Applied Surface Science 7659 (2002) 1-4.	-
	374	AESCHLIMANN, M. et al., "Competing nonradiative channels for hot electron induced surface photochemistry", Chemical Physics, April 15, 1996, pp. 127-141, Vol. 205, Issue: 1-2.	-
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	376	AUERBACH, D. et al., "Reagent Vibrational Excitation: A Key to Understanding Chemical Dynamics at Surfaces?", abstract only. (Date Unknown).	-
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	379	BONN, M. et al., "Phonon- Versus Electron-Mediated Desorption and Oxidation of CO on Ru(0001)", Science, Vol. 285, Number 5430, Issue of 13 Aug 1999, pp. 1042 - 1045.	-
	380	CHANG, Y. et al., "Coherent phonon spectroscopy of GaAs surfaces using time-resolved second-harmonic generation", Chemical Physics, 251/1-3, pages 283-308, (2000).	-
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	382	CHOI, C.K. et al., "Ultrafast carrier dynamics in a highly excited GaN epilayer", Physical Review B, Vol. 63, 115315, 15 March 2001, 6 pages.	-

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Filing Date	7/23/2003
First Named Inventor	Anthony C. Zuppero
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Examiner Name	Alan D. Diamond
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	383	DEBERNARDI, A. et al., "Anharmonic Phonon Lifetimes in Semiconductors from Density-Functional Perturbation Theory", Physical Review Letters, VOL. 75, NUMBER 9, 28 AUGUST 1995, pp 1819 - 1822.	Same as cite no. 64
	384	DELFATTI, N. et al., "Temperature-dependent electron-lattice thermalization in GaAs", Physical Review B, 15 FEBRUARY 1999-I, Vol. 59, Number 7, pp 4576 - 4579.	Same as cite no. 74
	385	DENZLER, D.N., et al., "Surface femtochemistry: Ultrafast reaction dynamics driven by hot electron mediated reaction pathways", Femtochemistry and Femtobiology: Ultrafast Dynamics in Molecular Science. (World Scientific, 2002).	Same as cite no. 73
	386	DIESING, D. et al., "Surface reactions with hot electrons and hot holes in metals", Surface Science, 331-333, 1995, pages 289 - 293.	
	387	DRISKILL-SMITH, A. A. G. et al., "The "nanotriode": A nanoscale field-emission tube", Applied Physics Letters, November 1, 1999, Vol. 75, Issue 18, pp. 2845-2847.	
	388	FAN, C. Y. et al., "The oxidation of CO on RuO <sub>2</sub> - TiO <sub>2</sub> at room temperature", Journal of Chemical Physics, Vol. 114, Number 22, 8 June 2001, P 10058.	Same as cite no. 200
	389	FRESE, K.W., Jr. et al., "Hot electron reduction at etched n-Si/Pt thin film electrodes", Journal-of-the-Electrochemical-Society, Vol. 141, September 1994, pages 2402-9.	Same as cite no. 305
	390	FUNK, S. et al., "Desorption of CO from Ru - 001 - induced by near-infrared femtosecond laser pulses", Journal of Chemical Physics, Vol. 112, Number 22, 8 June 2000, pages 9888 - 9897.	Same as cite no. 319
	391	GADZUK, J. W., "Resonance-assisted hot electron femtochemistry at surfaces", Physical Review Letters, May 27, 1996, Vol. 76, Issue 22, pages 4234-4237.	
	392	GADZUK, J. W., "Multiple Electron Processes in Hot-Electron Femtochemistry at Surfaces". <a href="http://www.csl.nist.gov/div837/837.03/highlite/gadzuk1999.htm">http://www.csl.nist.gov/div837/837.03/highlite/gadzuk1999.htm</a> (Date Unknown).	Same as cite no. 304
	393	GADZUK, J. W., "Surface Femtochemistry with Fast Lasers and Slow Nanostructures", <a href="http://www.csl.nist.gov/div837/837.03/highlite/previous/dielmim.htm">http://www.csl.nist.gov/div837/837.03/highlite/previous/dielmim.htm</a> (Date Unknown).	

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Sheet 54 of 62

## Complete If Known

Application Number	10/625,801
Filing Date	7/23/2003
First Named Inventor	Anthony C. Zuppero
Art Unit	1753
Examiner Name	Alan D. Diamond
Attorney Docket Number	22122878-70

## OTHER PRIOR ART - NON PATENT LITERATURE DOCUMENTS

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	394	GAILLARD, F. et al., "Hot electron generation in aqueous solution at oxide-covered tantalum electrodes. Reduction of methylpyridinium and electrogenerated chemiluminescence of Ru(bpy) <sub>3</sub> 2+", Journal of Physical Chemistry B, Vol. 103, No. 4, January 28, 1999, pages 667-74.	Same as cite no. 306
	395	GAO, S., "Quantum kinetic theory of vibrational heating and bond breaking by hot electrons", Physical Review B, Vol. 55, No. 3, 15 January 1997-I, pages 1876-1886.	Same as cite no. 321
	396	GERGEN, B. et al., "Chemically Induced Electronic Excitations at Metal Surfaces", Science, Vol. 294, Number 5551, Issue of 21 December 2001, pages 2521-2523.	Same as cite no. 82
	397	GUO, J. et al., "The desorption yield dependence on wavelength of femtosecond laser from CO/Cu(111)", Annual Meeting of the American Physical Society, March 1999, Atlanta, GA; Session BC18 - Surfaces (General), ORAL session, March 21; Room 258W, GWCC [BC18.06].	
	398	HESS, S. et al., "Hot Carrier Relaxation by Extreme Electron - LO Phonon Scattering in GaN", <a href="http://www.physics.ox.ac.uk/rtaylor/images/hot%20carrier%20poster.pdf">http://www.physics.ox.ac.uk/rtaylor/images/hot%20carrier%20poster.pdf</a> (Date Unknown).	Same as cite no. 89
	399	HOFER, U., "Self-Trapping of Electrons at Surfaces", Science, Vol. 279, Number 5348, Issue of 9 January 1998, pages 190 - 191.	
	400	KATZ, G. et al., "A theoretical study of hole induced desorption", Journal of Chemical Physics, October 22, 1999, Vol. 111, Issue 16, pages 7593-7598.	
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	403	NIENHAUS, H., "Electronic excitations by chemical reactions on metal surfaces", Surface Science Reports, 45, (2002), pages 1 - 78.	Same as cite no. 104

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Sheet 55 of 62

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Application Number	10/625,801
Filing Date	7/23/2003
First Named Inventor	Anthony C. Zuppero
Art Unit	1753
Examiner Name	Alan D. Diamond
Attorney Docket Number	22122878-70

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	404	PLIHAI, M. et al., "Role of intra-adsorbate Coulomb correlations in energy transfer at metal surfaces", Physical Review B, July 15, 1998, Vol. 58, Issue 4, pages 2191-2206.	Same as cite no. 168
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	408	SAALFRANK, P. et al., "Quantum dynamics of bond breaking in a dissipative environment: Indirect and direct photodesorption of neutrals from metals", J. Chem. Phys. 105 (6), 8 August 1996, pages 2441 - 2454.	
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	410	WHITE, J. M., "Using photons and electrons to drive surface chemical reactions", Journal of Molecular Catalysis A: Chemical 131, 1998, pages 71-90.	
	411	ZHDANOV, V.P. et al., "Substrate-mediated photoinduced chemical reactions on ultrathin metal films", Surface Science, Vol. 432 (#3), pages L599-L603, Jul 20, 1999.	Same as cite no. 150
	412	ZHU, X.-Y., "Surface photochemistry: from hot reactions to hot materials", Surface Science, Vol. 390, (1997), pages 224-236.	

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Sheet: 56 of 62

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	413	DANIEL J. AUERBACH, Hitting the Surface Softly, www.sciencemag.org, Vol 294 Science, December 21, 2001, pp. 2488-2489.	
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	418	Y.HUANG, C.T RETTNER, D.J. AUERBACH, A.M. WOODTKE, Vibrational Promotion of Electron Transfer, sciencemag.org, Vol 290, October 6, 2000, pgs.111-114.	
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	421	HENRY WEINBERG, ERIC W. McFARLAND, A. MAJUNDAR, B. GERGEN, HERMAN NIENHAUS, W., H.S BERGH, Direct detection of electron-hole pairs generated by chemical reactions on metal surfaces, 2000 Elsevier Science B.V., Surface Science, pgs. 335-342.	
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	422	XIAOFENG, FAN, GEHONG, CHRIS LABOUNTY, AND BOWERS, JOHN E., CROKE, EDWARD, AHN, CHANNING C., HUXTABLE, SCOTT, MAJUMDAR, ARUN, SHAKOURI, ALI; SiGeC/Si superlattice microcoolers; Applied Physics Letters, Volume 78, Number 11, 12 March 2001, Pg: 1580-1582.	
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		Same as cite no. 28	

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	424	HARRISON, P., SOREF, R.A.; Population-inversion and gain estimates for semiconductor TASER.	Same as cite no. 29
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Sheet 58 of 62**Complete if Known**

Application Number	10/625,801
Filing Date	7/23/2003
First Named Inventor	Anthony C. Zuppero
Art Unit	1753
Examiner Name	Alan D. Diamond
Attorney Docket Number	22122878-70

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	432	H. NIEHAOUS et al., "Direct detection of electron-hole pairs generated by chemical reaction on metal surfaces", Surface Science 445 (2000), Pages 3350342.	Same as cite no. 103
	433	H. NIEHAUS et al., "Selective H atom sensors using ultrathin Ag/Si Schottky diodes", Applied Physics Letters, Volume 74, Number 26, 28 June 1999, Pages 4046-4048.	Same as cite no. 106
	434	JJ PAGGEL et al., "Quantum-Well States as a Fabry-Perot Modes in a Thin-Film Electron Interferometer", www.Sciencemag.org Science Vol 284 12 March 1999, Pages 1709-1711.	Same as cite no. 111
	435	JJ PAGGEL et al., "Quasiparticle Lifetime in Macroscopically Uniform Ag/Fe(100) Quantum Wells", Physical Review Letters, Volume 81, Number 25, 21 December 1998, Pages 5632-5635.	Same as cite no. 112
	436	JJ PAGGEL et al., "Quantum well photoemission from atomically uniform Ag films: determination of electronic band structure and quasi particle lifetime in Ag(100), Applied Surface Science 162-163(2000), Pages 78-85.	Same as cite no. 113
	437	N.PONTIUS et al., "Size-dependent hot-electron dynamics in small Pd <sub>n</sub> -cluster", Journal of Chemical Physics, Volume 115, Number 22, 8 December 2001, Pages 10479-10483.	Same as cite no. 121
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Sheet 59 of 62**Complete if Known**

Application Number	10/625,801
Filing Date	7/23/2003
First Named Inventor	Anthony C. Zuppero
Art Unit	1753
Examiner Name	Alan D. Diamond
Attorney Docket Number	22122878-70

**OTHER PRIOR ART -- NON PATENT LITERATURE DOCUMENTS**

Examiner Initials <sup>1</sup>	Cite No. <sup>1</sup>	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published	T <sup>2</sup>
	439	G. SUN et al., "Phonon-pumped terahertz gain in n-type GaAs/AlGaAs Superlattices, Applied Physics Letters, Volume 78, Number 22, Pages 3520-3522.	Same as cite no. 32
	440	V. P. ZHDANOV et al., "Substrate-mediated photoinduced chemical reactions on ultrathin metal films", Surface Science 432 (1999), Pages L599-L603.	Same as cite no. 150
	441	H. PARK et al., "Nanomechanical oscillations in a single-C60 transistor", Letters to nature, Volume 407, September 7, 2000, www.nature.com, Pages 57-60.	
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	444	K. SVENSSON et al., "Dipole Active Vibrational Motion in the Physisorption Well", Physical Review Letters, Volume 78, Number 10, 10 March 1997, Pages 2016-2019.	Same as cite no. 253
	445	R. D. VALE et al., "The Way Things Move: Looking Under the Hood of Molecular Motor Proteins", Science, Volume 288, 7 April 2000, www.sciencemag.org, Pages 88-95.	
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Application Number	10/625,801
Filing Date	7/23/2003
First Named Inventor	Anthony C. Zuppero
Art Unit	1753
Examiner Name	Alan D. Diamond
Attorney Docket Number	22122878-70

Sheet 60 of 62

**OTHER PRIOR ART - NON PATENT LITERATURE DOCUMENTS**

Examiner Initials	Cite No. <sup>1</sup>	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published	T <sup>2</sup>
	448	P. ARMOUR et al., "Hot-electron transmission through metal-metal interfaces: a study of Au/Fe/Au trilayers in GaAs substrates", Applied Surface Science 123/124 (1998), Pages 412-417.	
	449	C.D. BEZANT et al., "Intersubband relaxation lifetimes in p-GaAs/AlGaAs quantum wells below the LO-phonon energy measured in a free electron laser experiment", Vacuum Solutions Online, Semicond. Sci. Technol. 14 No. 8 (August 1999) L25-L28, PI: S0268-1242(99)03669-X.	Same as cite no. 46
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**Complete if Known**

Application Number	10/625,801
Filing Date	7/23/2003
First Named Inventor	Anthony C. Zuppero
Art Unit	1753
Examiner Name	Alan D. Diamond
Attorney Docket Number	22122878-70

U. S. PATENT DOCUMENTS					
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		Number-Kind Code <sup>2</sup> (if known)			
	454	US- 6,114,620	09-05-2000	Zuppero et al	
	455	US- 5,641,585	01-24-1997	Lessing et al	
	456	US- 5,593,509	01-14-1997	Zuppero et al	Same as cite no. 312
	457	US- 4,793,799	12-27-1988	Goldstein et al	
	458	US- 3,694,770	09-1972	Burwell et al	Same as cite no. 286
	459	US- 3,925,235	12-1975	Lee, Vin-Jang	
	460	US- 4,045,359	08-1977	Fletcher et al	
	461	US- 4,407,705	10-1983	Garscadden et al	
	462	US- 5,048,042	09-1991	Moser et al	Same as cite no. 10
	463	US- 6,114,620	09-2000	Zuppero et al	Same as cite no. 454
	464	US- 6,218,608	04-2001	Zuppero et al	
	465	US- 6,222,116	04-2001	Zuppero et al	
	466	US- 6,268,560	07-2001	Zuppero et al	
	467	US- 2001/0018923	09-2001	Zuppero et al	Same as cite no. 272
	468	US- 6,327,859	12-2001	Zuppero et al	
	469	US- 2002/0017827	02-2002	Zuppero et al	Same as cite no. 353
	470	US- 2002/0196825	12-2002	Zuppero et al	
	471	US- 2002/0196825	01-2003	Zuppero et al	Same as cite no. 470
	472	US- 6,649,823	11-2003	Zuppero et al	Same as cite no. 355

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Application Number	10/625,801
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Examiner Name	Alan D. Diamond
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